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Mini Review

Parafunction and Dental Implants

S Keerthana Gayathri[1]

[1]*Department of Prosthodontics, Ramakrishna Dental College, Coimbatore-641044*

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ABSTRACT

The parafunctional forces exerted on teeth or any prosthesis like dental implants have long been implicated to cause trauma to the stomatognathic system and are categorised by persistent or prolonged occlusion. The most standard cause of early and late implant failure after successful placement of dental implant has been ascribed to parafunction. The treatment planning for parafunctional cases involves careful evaluation of various factors. These factors comprise mainly of progressive bone loading, greater surface area occlusion, prosthesis design etc. This review concentrates on the parafunctional forces and their impact on dental implants. It also briefly describes the possible preventive measure and modifications in treatment planning required for the addressed issue.

Keywords: Parafunction, Occlusion, Dental implant, Occlusal guard

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Address for Correspondence:

Dr S Keerthana Gayathri
Student,
Ramakrishna Dental College,
Coimbatore-641044
Email Id – keerthu.sr@gmail.com

Introduction

The parafunctional forces exerted on teeth or any prosthesis have long been attributed to cause harm to the stomatognathic system and are characterized by repeated or prolonged occlusion[1–3]. When these offset forces are applied on dental implant prosthesis, the effects are very deleterious[4,5]. Often as a result of parafunction, there is complete absence or lack of osseointegration of an implant during healing[6]. The most common cause of both early and late implant failure after successful stage one implant therapy has been ascribed to parafunction. Such complications occur most frequently in the maxilla because of a decreased bone density and thus increase in the resulting moment of force[7,8]. During treatment planning, the presence of such parafunctional habits should be accounted for.

Nadler has classified the causes of parafunction or non-functional tooth contact into six categories namely local, systemic, psychological, occupational, involuntary and voluntary [9]. Local factors consist of the form of tooth, occlusion and soft tissue changes like ulcerations while the systemic factors include neurological disorders and psychological causes which occur with highest frequency including the release of emotional stress or anxiety. Occupational factors concern professionals having a tendency to develop altered oral habits such as dentists, athletes, and precision workers, the seamstress or musician. The fifth cause is involuntary movement that evokes bracing of the jaws, such as during lifting of heavy objects or sudden jerk while driving. Voluntary causes include chewing gum or pencils, bracing the telephone between the head and shoulder, and pipe smoking.
The current dental literature does not identify bruxism and clenching as separate entities. Although several aspects of the treatment for both are similar, their diagnosis and treatment are different in many ways. The magnitude of parafunction may be classified as either absent, mild, moderate, or severe [10, 11]. Bruxism is the most critical factor to evaluate for any dental implant prosthetic reconstruction which is why long-term success cannot be obtained with severe parafunctional habits. Therefore the clinician must try to diagnose the presence of these conditions.

It was discovered that for every 1-mm increase in implant diameter, there is a 96.9% decrease in the probability of implant fracture. Other factors such as direct adjacency to cantilevers and bruxism increased the probability of implant fracture by 247.6% and 1819.5%, respectively. Implants of wider diameter offer increased resistance to the stresses experienced in these clinical situations when prosthesis design and parafunctional habits are not optimal [12].

The magnitude of stress exerted depends on two variables: force magnitude and cross-sectional area over which the force is dissipated. Dentists cannot control the force magnitude completely. The amount of the force applied may be decreased by reducing some significant magnifiers of force like cantilever length, offset loads, and crown height. The functional surface area over which the force is distributed, however, is controlled completely through careful treatment planning.

Treatment planning for parafunctional cases

Progressive Bone Loading

The time intervals between prosthodontic restoration appointments may be increased to provide additional time to produce load-bearing bone around the implants through progressive bone- loading techniques. By using the progressive bone-loading technique, a poorer bone density can be transformed into a better quality bone that is ideal for bearing excessive occlusal loads[13].

Greater Surface Area

Anterior implants that are subjected to parafunctional stresses are detrimental because they usually have nonaxial or shear components in the forces applied on them. The use of wider-diameter implants or increasing the number of implants (i.e. greater surface area) should be planned to counteract these excessive forces [12,14].

Occlusion

In a patient with parafunctional habits, a canine guided occlusion is preferred as long as canines are healthy [15]. Mutually protected occlusion, with additional anterior implants or teeth-distributing forces, is developed if the implant is placed in the canine position or if this tooth is restored as a pontic. The elimination of posterior lateral occlusal contacts also known as non axial loading, during excursive movements is recommended when the implants are opposing natural teeth or tooth-supported fixed prosthesis. Recreating the incisal guidance is needed by modifying the anterior teeth to prevent posterior interferences during excursions. This is advantageous in 2 respects- one, elimination of posterior contacts significantly decreases the negative effect of angled forces during bruxism. Two, almost all fibers of the masseter, temporalis, and the pterygoid muscles contract and place higher stresses on the anterior implants with the presence of posterior contacts during lateral or protrusive excursions [14,16].

Prosthesis Design

The implant supported prosthesis should be designed to improve the distribution of stress throughout the framework with centric vertical contacts aligned along the long axis of the implant whenever possible. Narrow posterior occlusal tables are provided to prevent inadvertent lateral forces and to decrease the occlusal forces.[17]Enameloplasty of the cusp tips of the opposing natural teeth can help improve the direction of vertical forces by correcting the plane of occlusion. Newer crown materials (e.g. zirconia), wider implant bodies, harder cement types (e.g., resin cement), titanium alloy implant bodies, and more implants splinted together are all beneficial in reducing the parafunctional forces transmitted to implants.

Occlusal Guard

The most important post treatment care for a patient with parafunctional habits include the use of an occlusal guard. Ideally patients are advised to wear a hard, processed acrylic occlusal guard during times of parafunctional activity. The guard absorbs the majority of the forces, reducing the damaging vectors to the implant system. Patients should also be instructed to wear the guard during any time they might exhibit parafunction, such as stressful time periods, driving, and working at a computer [18,19].

Conclusion

Night guards can be given to patients for decreasing nocturnal parafunction; occlusal restorative materials that can decrease impact force; and overdentures, rather than fixed prostheses, that can be removed at night are further examples of force reduction strategies. Implant supported prosthesis can be given in patients with parafunctional habits but that necessitates a proper diagnosis and treatment planning which includes planning for placement of more implants, use of wider diameter implants, minima to nol cantilevers, narrower occlusal table and a mandatory occlusal guard for post treatment care.

Authors' contribution

S Keethana Gayathri: Manuscript editing, Literature search, data collection

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Conflict of interest

The authors have nothing to disclose or any conflicts of interest.

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